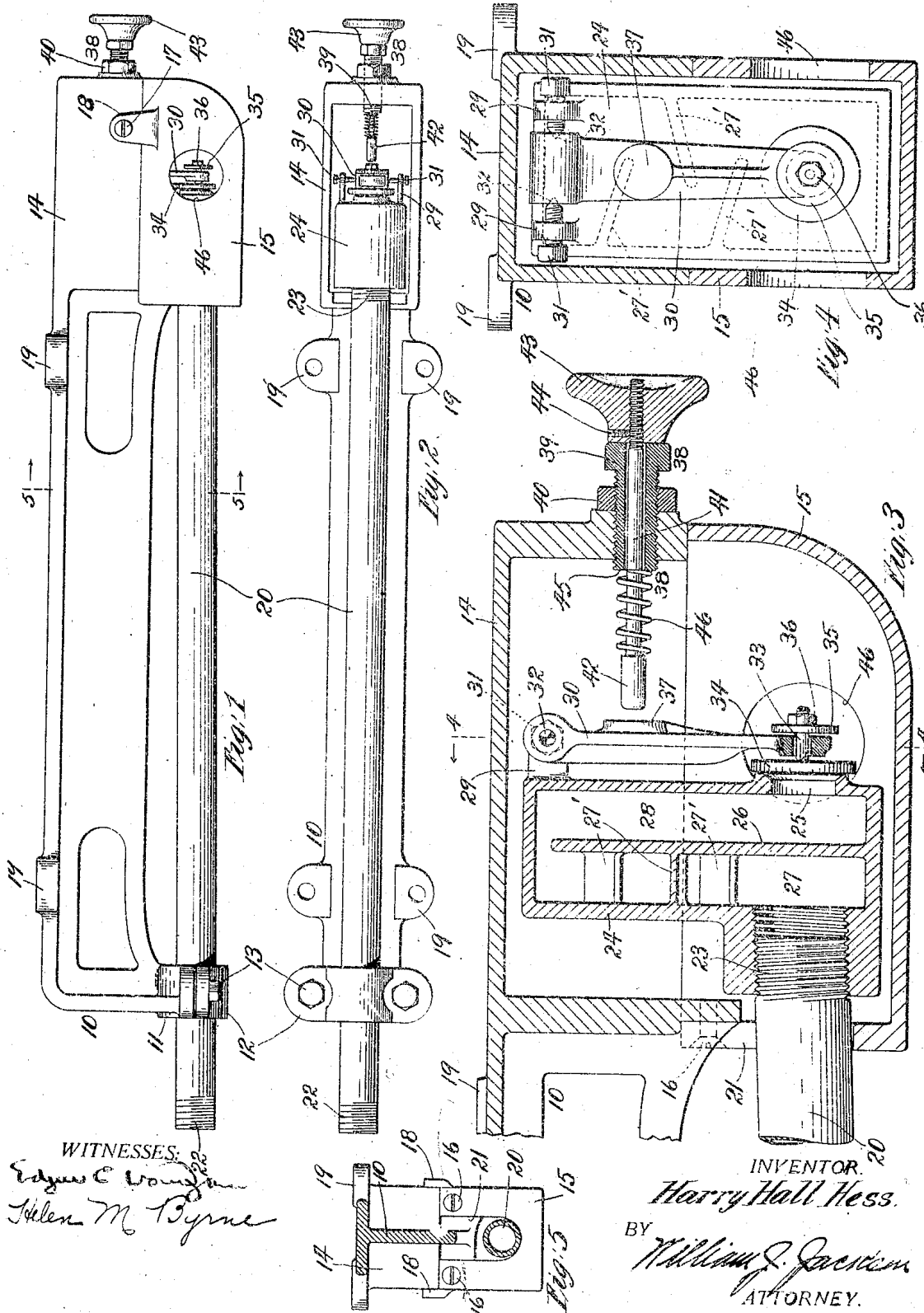


H. H. HESS.  
AIR AND VACUUM CONTROLLING DEVICE.  
APPLICATION FILED SEPT. 10, 1915. RENEWED JULY 25, 1916.

1,239,440.

Patented Sept. 4, 1917.



WITNESSES:  
Edgar C. Wouda  
John M. Byrne

INVENTOR.  
Harry Hall Hess.  
BY  
William J. Jackson  
ATTORNEY.

## UNITED STATES PATENT OFFICE.

HARRY HALL HESS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO VAPOR-VACUUM HEATING CO., OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

## AIR AND VACUUM CONTROLLING DEVICE.

1,239,440.

Specification of Letters Patent.

Patented Sept. 4, 1917.

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*To all whom it may concern:*

Be it known that I, HARRY HALL HESS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improved Air and Vacuum Controlling Device, of which the following is a specification.

The present invention relates to an improvement upon the air and vacuum controlling device shown and described in United States Letters Patent No. 924,617, dated June 8, 1909. Installation of the device manufactured under the above patent has demonstrated the presence of certain disadvantageous features, notably, difficulty with the stuffing-box arrangement, and water of condensation sputtering at the valve opening. The principal object of the present invention is to replace the aforementioned device with an air and vacuum controller, possessed, commercially speaking, of more efficient and reliable working parts, of more compact and more readily accessible parts and of simplified and cheapened construction. Other and further objects of the present invention reside in the providing of general details of construction and the combination thereof with other adjuncts hereafter referred to.

The invention consists of the improvements hereinafter described and finally claimed.

The nature, characteristic features and scope of the invention will be more fully understood from the following description taken in connection with the accompanying drawings forming part hereof and in which:

Figure 1, is a view in side elevation of the air and vacuum controlling device embodying the invention,

Fig. 2, is a plan view of the underside of the same, certain casing parts being removed,

Fig. 3, is a fragmentary view, principally in section, of the right hand side of Figs. 1, and 2,

Fig. 4, is a view in cross-section taken upon the line 4—4 of Fig. 3, and

Fig. 5, is a similar view taken upon the line 5—5 of Fig. 4.

In the physical embodiment of the invention illustrated in the drawings, 10, designates an elongated frame or hanger of cast iron. As shown in Fig. 5, this hanger is of

T-shaped cross-section: Integral with one end of the hanger and depending therefrom is, one part of a bracket or clamp 11, adapted for detachable attachment, to which is a companion part 12, bolts 13, being present for securing the parts together. The opposite end of the hanger has formed integral therewith one part of a shell or housing 14, detachably connected to which is a companion part 15. Screws 16, 17, are present for securing the parts together. One of the shell parts, in the drawings, the lower shell, is provided with lugs 18, for accommodating the screws 17. This shell is adapted to house certain parts to be presently described. The relatively broad, flat, top of the hanger 10, has formed integral therewith, laterally disposed ears 19, apertured for the passage therethrough of bolts for securing the hanger to place. Clamped beneath the vertical rib of the hanger 10, and in a medial line therewith, by the parts 11—12—13, is an elongated, brass, expansion tube 20, screw-threaded at each end. As shown this tube is slightly inclined from the clamp 11—12, upwardly toward the shell 14—15 for a purpose to presently appear, the free end of which tube is supported within the U-shaped, slotted portion 21, of the lower shell, see Figs. 3, and 5. The end 22, of the tube 20, is adapted for attachment to the return pipe of a so-called vapor-vacuum heating system, such as is disclosed in U. S. Letters Patent No. 968,668, dated August 30, 1910. The end 23, of the tube 20, carries a hollow casting 24, which is contained within the shell 14—15. This casting 24, is of rectangular configuration, is vertically disposed and is provided at one side and near its base with a screw-threaded boss to accommodate the end 23, of the tube 20. The outer wall of the casting has formed therein, at a point opposite the expansion tube, a valve opening 25, see Fig. 3. Extended from the bottom of the casting 24, to within a short distance of the top thereof is a central partition 26, thus forming separate compartments, 27, and 28. Compartment 27, has therein baffle plates 27', arranged at an angle and oppositely disposed as shown by dotted lines in Fig. 4, to form a tortuous passage. The baffle plates, preferably, are formed integral with the compartment walls. Hingedly connected to the outer wall

of casting 24, is means for closing the valve-opening 23. A description will now be given of such means. Suspended in a vertical manner from ears 29, on the casting, is an arm 30. The mode of suspension is accomplished by oppositely disposed screws 31, the points of which center in counter-sunk portions 32, of the arm 30. Lateral adjustments of the arm may thus be readily secured and a very easy moving hinge joint provided. Loosely passing horizontally through the lower end of the arm is a pin 33, screw-threaded at one end and having fixed to its other end a metallic vertical disk-valve or flap 34, for closing the valve-opening 23. A nut 35, and lock nut 36, cooperate with the screw-threaded end of the pin 33, to retain the flap 34, in proper position. In this connection it may be stated that there is a loose fit provided by this arrangement, see Fig. 3, so that the flap may readily adjust itself to any inequalities of the seat of the valve-opening 23. The rear of the arm 30, is provided with a boss 37, for abutting against an adjustably mounted, cushioning device 38, for maintaining in closed position the flap valve and to prevent buckling of the controller parts during an expansion period. The device 38, embraces the following parts: Penetrating the outer wall of the shell 14, and extended within the shell is an elongated nut 39, a lock nut 40, being present to retain the nut in adjusted position. Passing horizontally through the nut 39, is a rod 41, the inner end of which is provided with a fixed cap 42, and the outer end is screw-threaded to receive a knob or handle 43, which is fixed thereto as by a screw 44, see Fig. 3. Interposed between the cap 42, and the end 45, of the nut 39, is a coiled spring 46. By proper manipulation of the handle 43, the distance between the cap 42, and arm 30, may be regulated. Also tension of spring 46, may be regulated to prevent shifting of rod 41, by very slight pressure in system.

In installation the operation of the above described air and vacuum controlling device is as follows: Air which is present in the system passes through expansion tube, being pushed by the vapor in the system, and escapes through valve-opening 25, the flap-valve permitting of such escape. Simultaneously, vapor heats up the tube 20, and in expanding the casting 24, is moved outward so that the part 37, of the flap-valve arm abuts against the cap 42, of the cushioning device and maintains in closed position the flap-valve 34, thus confining vapor within the system. In this connection, it is to be noted that in order to prevent moisture or water of condensation reaching the valve opening, vapor in the casting 24, is caused to first advance away from and then toward said valve opening. As vapor advances

away from the valve opening, the baffles separate the moisture from the vapor and deflect the moisture or water of condensation back to the expansion tube. The latter being inclined away from the casting the water of condensation drains back through the tube and finds its way to the boiler. Thus water sputtering at the valve opening is eliminated. Should for any reason, a small quantity of water of condensation escape to the shell 15, it readily evaporates. In this connection the vents 46, in the shell permit of egress of air from the system, permit of air entering said shell and further provide means for inspecting the flap valve during operation of the device and the insertion therethrough of proper implements for cleaning of ground surfaces of valve and valve seat if necessary. With the flap valve closed, there is now confined within the system a full capacity of vapor, the heat units of which in transmission to a room being heated, cause condensing of the vapor, thus creating a vacuum within the system, the advantages of which are well known.

What I claim is:—

1. A device of the class described embracing an expansion tube clamped at one end and equipped at its free end with a casting forming a combined air and vapor chamber provided with a single egress opening, means within said chamber for causing air and vapor to pass first away from said egress opening and then toward it, a flap-valve for closing said opening, and means operative for maintaining in closed position said valve during expansion period.

2. A device of the class described embracing an expansion tube clamped at one end and equipped at its free end with a casting forming combined air and vapor chamber provided with a single egress opening, said tube being inclined downwardly from the said chamber to its clamped end, means within said chamber for causing air and vapor to pass first away from said egress opening and then toward it, a flap-valve for closing said opening, and means operative for maintaining in closed position said valve during an expansion period.

3. A device of the class described embracing an expansion tube clamped at one end and equipped at its other end with a casting forming a combined air and vapor chamber provided with a single egress opening, said tube being inclined downwardly from said chamber to its clamped end, means within said chamber for causing air and vapor to pass first away from said opening and then toward it, means for separating and deflecting backwardly to said tube water of condensation as the vapor passes in a direction away from the egress opening, a flap-valve for closing said egress opening.

ing, and means operative for maintaining in closed position said valve, during an expansion period.

4. A device of the class described embracing an expansion tube clamped at one end and provided at its free end with a casting forming a combined air and vapor chamber having a single egress opening, said tube being inclined downwardly from said chamber to its clamped end, a partition within said casting for forming communicating divisions, so disposed that air and vapor first pass in a direction away from the egress opening and then toward it, baffle plates within the division in which said air and vapor pass in a direction away from said opening, a loosely suspended flap-valve for relatively closing said egress opening and means operative for maintaining positively closed said valve during an expansion period.

5. A device of the class described embracing a hanger carrying at one end a shell, an expansion tube one end of which is clamped to the hanger and the free end of which projects within the shell and supports a hollow casting provided with a single egress opening said tube inclining downwardly from said casting to its clamped end, a flap-valve hinged to the casting for relatively closing said opening and cushioned means carried by the said shell for positively maintaining closed said valve during an expansion period.

6. A device of the class described embracing a hanger carrying at one end a shell, an expansion tube one end of which is clamped to the hanger and the free end of which projects within the shell and supports a hollow casting provided with a single egress opening said tube inclining downwardly from said casting to its clamped end, means arranged within the hollow casting for deflecting water of condensation back to the expansion tube, a flap-valve hinged to the hollow casting for relatively closing said opening and cushioned means carried by the shell operative for positively closing said valve during an expansion period.

7. A device of the class described embracing a hanger carrying at one end a two-part separable shell, an expansion tube one end of which is clamped to the hanger and the free end of which projects within the shell and supports a hollow casting provided with a single egress opening, said tube being inclined downwardly from said casting to its clamped end, means arranged within the hollow casting for separating water of condensation from vapor and deflecting it back to said tube, a flap-valve hingedly suspended from the hollow casting for relatively closing said opening and adjustably cushioned means carried by a fixed part of the shell operative for positively closing said valve

during an expansion period and for preventing buckling of the controller parts.

8. A device of the class described embracing a hanger carrying at one end a two-part shell provided with vents adjacent the egress opening of which one of said shell parts is detachable, an expansion tube, one end of which is clamped to the hanger and the other end of which projects within the shell and supports a hollow casting provided with a single egress opening, said tube being inclined from said casting downwardly to its clamped end, means within the casting for separating water of condensation from vapor and deflecting it back to the said tube, a flap-valve hingedly suspended from the hollow casting for relatively closing the said opening and adjustably cushioned means carried by a fixed part of the shell operative for positively closing said valve during an expansion period.

9. A device of the character stated embracing a hanger, an expansion tube clamped at one end to said hanger, a member provided with an egress opening and adapted to separate water of condensation from air and vapors fixed to the free end of the expansion tube, which tube is operatively positioned to drain water of condensation away from said member, a flap-valve mounted upon said member operative to relatively close said egress opening and cushioned means carried by the hanger coöperatively disposed with respect to the flap-valve to cause the latter to positively close said egress opening during an expansion period.

10. A device of the character stated embracing a hanger, an expansion tube clamped at one end to the hanger, a member provided with an egress opening and adapted to separate water of condensation from air and vapors fixed to the free end of the expansion tube, which tube is operatively positioned to drain water of condensation away from said member, a valve mounted upon said member operative to relatively close said egress opening and means carried by the hanger coöperatively disposed with respect to said valve to cause the latter to positively close said egress opening during an expansion period.

11. A device of the character stated embracing a member provided with an egress opening and adapted to separate water of condensation from air and vapors, an expansion tube connected at one end to and positioned to drain said member, a hanger to which the other end of said tube is fixed, means mounted upon said member for relatively closing said egress opening and independent means carried by the hanger positioned to cause said closure means to positively close the egress opening during an expansion period.

12. A device of the character stated embracing a member provided with an egress opening and adapted to separate water of condensation from air and vapors, an expansion tube connected at one end to and positioned to drain said member, a hanger to which the other end of said tube is fixed, means mounted upon said member for relatively closing said egress opening and independent means carried by the hanger positioned to cause said closure means to positively close the egress opening during an expansion period.

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bracing a member provided with an egress opening for the escape of air and vapors, an expansion tube connected at one end to and positioned to drain said member of any  
5 water of condensation that may be present therein, a hanger to which the other end of said tube is fixed, a freely suspended self aligning valve mounted upon said member for relatively closing said egress opening and

means carried by the hanger positioned to 10 cause said valve to positively close the egress opening during an expansion period.

In testimony whereof, I have hereunto signed my name.

HARRY HALL HESS.

Witnesses:

WILLIAM J. JACKSON,  
HELEN M. BYRNE.